Paul B. Sears: Through a Daughter's Eyes

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Abstract. Paul B. Sears was most at ease with his three children in any outdoor setting. There he pointed out the details of the landscape and the damage done by humans. He encouraged them to explore and deal with challenges. These interactions gave the children a sense of connection with their father that was often otherwise lacking. They also shared experiences on the family farm with Sears' parents, which provided insight into his childhood. As his career developed, both his extensive academic duties and his popularity as a lecturer and speaker at meetings, which entailed extensive travel, often kept him away from his family. Throughout his life, Sears pursued many interests and learned new skills; his sketches were used to illustrate his books, and he later took up watercolor painting and calligraphy. In his final years, he seemed to be haunted by doubts about personal issues and to be more pessimistic about the future of our ecosystem. However, he left his children with an appreciation of the natural world as he saw it and respect for his life's work.

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INTRODUCTION

This memoir explores paradoxical features of my father both as a public and private figure, as I experienced or learned of them. My experiences give the reader the perspective of a daughter of this extraordinary and complicated man. Because of his long life span (1891-1990) and the affinities we shared, he was a major influence in my life for almost 60 years. Although he was remote during my childhood and young adulthood, we became close toward the end of his life. As I wrote this essay, I learned more about my father than I knew as a child. I reread some of his published works as well as unpublished archival material and family letters, talked with my sister Catherine and my brother Paul's widow, and, in the process, reclaimed buried memories. I learned that some of my childhood perceptions were factually incorrect. Nevertheless, the major outlines of my father's story as I understood it were confirmed. Paul and Catherine, older than I, were children during a different part of our father's career. Among us, we span three decades as children in the home of the young professor at the University of Nebraska, the department head and best-selling author at the University of Oklahoma and scientist, public speaker and environmentalist at Oberlin College.

CHILDHOOD ADVENTURES AND LESSONS

Father was most at ease with his children in outdoor settings, and, unquestionably, in such settings we received the benefits he had to offer as a father and a person. Outdoors, our father, comfortable and alert, was informal and likeable. As my sister Catherine wrote in this volume, one of Father's gifts to his children was to make us "at home" in the natural world. His observations and generalizations piqued our curiosity. For example, I remember him saying, "You will always find a human settlement near water." I think his children *always* believed him on such matters, but we appeared inquiring and skeptical and often needed more information before we accepted any generalization. Therefore, if we became clearly curious or looked like we *probably* believed him, he would offer an explanation. "Where a river reaches a valley, for example, and the land level at last spreads out, making agriculture possible, you will find a human settlement." To clinch the issue of his authority and to continue to teach us, he would add, "... and, of course, a streambed is itself a natural path."

Whenever we were with him outdoors, he spoke to us about the landscape and the "humanscape", pointing out its salient features around us and putting them in context. For example, he would stop the car by a pasture to show us how a fence can create two separate ecological situations or at a river to show us the brilliant colors of wet stones.

As an introduction to the devastating effects of humans on the environment, he taught us how to recognize fool's gold with its metallic flecks that glittered so invitingly in the sunlight and then explain the various means of obtaining real gold by hand techniques demanding discipline, patience and repetitive activities. He would then explain the ecological damage caused by use of heavy machinery to deforest, level and strip the land, common mining techniques that are still in use today. For much of his life, he committed himself to, and kept faith in, the effectiveness of education, persuasion and negotiation with industrialists and other polluters in order to minimize the environmental damage.

With a constant flow of interesting and informative environmental information, my father pointed out old mines and the scarred land around them; the properties of soil or stone; the erosion caused by non-contour plowing, then still the most common practice; the weathering of horizontally layered sedimentary rocks and the climatic and geological history they revealed; the varying actions of flowing water and the patterns formed in the land by deviations in the channel over time as "a river always changes course". In addition to informing and showing us what was happening in any landscape, he wished us to learn for ourselves what he meant by "hands-on" experience. This approach was characteristic of my father's field trips with his students and exemplified his conviction that the combination of instruction, observation and praxis in an actual setting was a far superior mode of teaching than that offered by the typical laboratory courses in most colleges. I realized in college that field trips with my father, in fact, were wonderful.

Father encouraged us to explore the streams, to dam them, to wade in and across them and to scour the terrain on either side. He nurtured our almost instinctive inventiveness in making up new games or tasks such as building a double dam to form a natural holding place for a pond and then looking to see what tiny forms of life emerged in the pond. These included foamy clusters of semitransparent frog's eggs or, if we were lucky, pollywogs already hatched from those eggs, minnows or water spiders shooting across the pond's top. From that experience we learned about the surface tension of water.

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In the outdoors, we learned to watch for danger and avoid it without fear; to spot anything interesting and approach it without disturbing it. When we later moved to cities, becoming streetwise was almost an automatic transition for us. We had been trained to notice everything in and about our environment. To "notice" meant to be alert with all five senses. "Never ignore a sound," my father would say, meaning a sound that was sudden, unexpected or uncharacteristic of our setting.

Father taught us that "everything" included processes as well as objects: not only the manifold items, the life forms and physical details of the landscape but also the interplay among those items, the activity of the phenomenal world and its various forces at play. Speaking of what a landscape means to an ecologist, he observed that

> ...[it] presents a great deal more than its technical details.... Rather, it appears as a totality, with each factor . . . considered in relation to the others. [The ecologist's] work involves analysis, of course, but only as a means to a final synthesis and interpretation. When he enters a forest or a meadow, he sees not merely what is there but what is happening there [and thus] is afforded a glimpse of continuity, integration and destiny (Sears 1935 p 223).

Father was wonderful when teaching survival skills. He taught us how to orient ourselves by noting the changing position of the sun, or by finding the lightest area of the sky or by gauging directions in other ways. For example, he would point with his walking stick to a patch of moss growing on the bottom of a tree and then on another and say, "See, the moss is growing on the same side of all these trees: *usually* moss grows on a tree's *north* side. Remember that." Or, if we were traversing very unfamiliar ground he would say, "Find a landmark every time you enter a different section of the woods or change direction and remember them, memorize them. Just as the sun was on your left side when you entered the forest and should be on your right when you are leaving it, so with the landmarks." When we walked, he would point out faint paths made by small animals and tell us if no other way was clear follow these paths "because animals always know the easiest way through the forest, for they must conserve their energy."

Characteristically, my father provided us with a context for any item he pointed out such as animal tracks or a landmark boulder. Of the latter, he would say that it "had been there long before the woods itself" for it had been deposited by a glacier during the last ice age. He taught us these things so that we might safely traverse unfamiliar terrain and make ourselves an extension of our environment. He took us into the deepest parts of what was and still is a virgin forest on his father's farmstead near Bucyrus, Ohio, and showed us how to find our way home from any point in that area at any time of year as well as explore it at random, going to new spots for fun and, best of all, to find something new. I suppose we felt great pleasure because he made the learning and discoveries exciting. His acute observational skill, knowledge and passionate love of the earth were contagious. He would pick up a small brown, slightly wrinkled gall, lighter than seemed possible, fragile in texture and round with a tiny hole in it and say, "Look, do you know what this is?" and hand it to one of us. He would give us the name and explain that it was the shell of a home built by an insect from its own secretions that protected and fed its larva with nourishment from the tree to which it was once attached and where the nourished occupant had bored that little hole and escaped as an adult insect. Father's knowledge of insect galls came from his early research on this topic at the Lake Laboratory at Cedar Point (Sears 1914).

If we were hunting wild mushrooms, he would tell us that their most likely locations were in a pile of leaf mold, near or around a rotting stump or near a fallen, decaying tree. In passing, he would tell and show us how death and falling of the tree opened the forest canopy for saplings to receive sunlight, how the decomposition of the tree returned vital nutrients to the earth, enriching the soil for other plants, how all taken together these events provided conditions for new life to spring forth almost immediately and how intense was the competition among plants for sunlight.

In studying our local deciduous forest, we learned more about forests plants in general, in the same manner that studying mushrooms or spotting a group of little white Indian pipes, we learned about heterotrophs. Father gathered puffballs to teach us about one method of plant reproduction, by spores, as well as about which plants were safe to eat and which were not. He encouraged us to smell, taste and touch to learn texture, size and ripeness and devour every form of edible wild berry, while with authority and precision, he pointed out and had us touch poisonous berries to note their size, shape, color and texture and also the shape of leaves and texture of bark on whatever tree or shrub bore them. As a matter of course, he told us both the popular and technical names of all the plants we encountered. Like Catherine, I have forgotten many of the scientific names of wildflowers, but I can visualize many of the actual plants from their tiniest detail to the whole plant and even, at times, the spot of woods around it. In my mind's eye, I certainly can see a tree with its root system as a mirror image of the shape and pattern of the spreading branches above.

Father's teaching gave us a sense of connection with the world and with him and seemed to sustain our lives. It was extremely interesting to the three of us. Fascinated, we absorbed and internalized everything we could of what our father, the naturalist, taught us. His way of seeing became ours. Wittingly or not, he had given us a great gift. So it was sometimes with irony that, when we were adults, we acknowledged, accepted and even applauded this gift as part of our own nature.

Shortly before my brother, Paul, died so suddenly in 1984, we walked together in the wild meadow leading to a bosque beside the Rio Grande near his Albuquerque home. I did not know that this would be the last walk he and I would ever take, let alone the last time I would see him alive. Nor did I know that his wife and sons would scatter his ashes in that very meadow. We did not speak much. He pointed out an occasional wildflower so tiny as to be scarcely visible, a pile of tumbleweeds snagged on a bush, a hare. I asked him about a bright rock I found. He found another and gave it to me while he told me how high the river rises during the rainy season and what plants bloom at that time of the year. Then, pointing to a small almost transparent snakeskin, Paul said, "This is the one plus side to our rearing. I always know that wherever I walk, anywhere, I see a hundred things and dozens of things happening that no one else even notices. That, at least, is something."

From our outdoor adventures with my father, we absorbed, almost unconsciously but with acceptance and deep interest, the awareness that life and death are tied inextricably with one another as different aspects of a larger whole. These are principles that my father taught so beautifully and that exemplify the integrative character of his thought about a world of ceaseless change.

EXPERIENCES ON THE SEARS' FAMILY FARM

As children, my father shared with us his experiences as a child during our yearly visits to his parents in Bucyrus and the rural farm

community where he was born. As a boy, he lived before electricity and the internal combustion engine were part of one's daily life. He remembered the first car, radio and telephone. In his teens, after his maternal grandfather died, my father and his family moved from a nearby house into the red brick, ivy-covered, Victorian home, Rosedale, to which we returned almost every summer during my childhood. Three stories high, Rosedale had gables, a turret and even a secret passageway. Sparrows nested in the ivy. Outside the back door, a cherry orchard thrived, along with rows of currant and gooseberry, a strawberry patch, a large vegetable garden and flowers everywhere including hollyhock, sweet pea, snapdragon, many varieties of rose, nasturtium and lupine. In the front, beside the smoke tree at the beginning of the long walk leading from street to house, two stone planters overflowed with petunias whose fragrance filled the sloping green lawn under giant elms, maples and oaks. In the back was a corncrib filled with dried ears after harvest and an outdoor pump from which flowed sweet, soft water. The house had indoor plumbing with hot and cold running water, but that water was hard and unpalatable. Not far from the hand pump was a chicken coop that provided fresh eggs daily and dinner on Sundays. Grandfather dispatched the fowl for same with considerable élan and we grandchildren gathered round to watch every detail of the ritual.

The birds, once dead, became Grandmother's task, with the other adult women including aunts, daughters-in-law and the family's live-in housekeeper, Celestia, helping. Cooking, by stuffing and roasting them, was the least of the work. The birds were defeathered, singed, eviscerated and washed. Rather than resenting these tasks, however, I found them fascinating. I learned early basic facts about life and death in a way that only direct experience can give, in a context that made them seem natural. All the rituals of daily life at Rosedale such as picking and canning cherries, gathering eggs and pumping water, were replete with a sense of tradition. I knew what my father saw and did as a child. In what I was then seeing and doing, I sensed that a mode of life that was disappearing shaped the course of my father's life and was intrinsic to the formation of the attitudes and values that guided him.

The cleaning of poultry or game was not a mere disagreeable job. It was an event. We were summoned to witness the inquest and identify all of the interior decorations and learn what they were good for. No technical words were needed at this stage; windpipe, gullet and egg sac did well enough. We saw the muscular gizzard with its tough lining and gravelly contents for grinding food, feathers expanding from their sheaths and the powerful tendons that curve the toes into a tight grip."

Following my father's strict orders, we addressed his mother as "Mother Sears." Sometimes she found a rare treat of unlaid or immature eggs when gutting the birds. These eggs had neither whites nor shells. When added to the gravy at the last minute and cooked, they looked like pale yolks of hard-boiled eggs but with a more delicate texture and flavor. A delicacy indeed, these eggs typically were reserved for the adult males, Grandfather, my father and his uncles. Given the tasks involved, compounded by the Victorian largess in the number of different dishes prepared, dinner on Sunday, after mandatory church attendance, comprised the day.

SEARS' RELATIONSHIP WITH HIS PARENTS

As a child, I knew little about the background of my paternal grandmother. I did not know that "Mother Sears" had a college degree from and was the first woman trustee of Ohio Wesleyan University, a member of Phi Beta Kappa, a teacher at Ohio Wesleyan University, then to principal of Bucyrus High School across the street from Rosedale, where she had lived with her father and brothers before her marriage or before becoming a talented painter. My grandmother was a "natural force" like the weather, dominating the entire household including her husband, a lawyer and quite formidable in his own right, her three sons, her daughters-in-law and her grandchildren.

According to my father, his mother was the central figure of his childhood. She fostered the birth and nurture of his early interest in science. After I wrote my memories of Rosedale and his mother, I received an article my father wrote for *Mademoiselle* (1952 p 83, 142) that is very similar to my own recollections:

> I remember with gratitude that the home in which I grew up was not only a wonderful home but a living laboratory of unceasing interest ... the heavy routine of caring for a household with three lively boys was constantly illuminated by her understanding of what was going on. Her kitchen was a laboratory in the best sense of that word, not a cold thing of porcelain, steel and glass but a place where science was used and constantly demonstrated ... The cistern pump served to demonstrate simple hydrostatics. Buoyancy, displacement and specific gravity were shown to us by the behavior of potatoes and eggs ... or blocks of wood in a dish pan of water. We learned simple facts about the geometry of light from mirror, burning glass and crystal pendants.

"Mother Sears" held sway over my father's later life and her influence was not always an occasion for gratitude. Two examples of her rule that bore painfully upon his later life illustrate this point. In his early 20s, my father fell in love with a highly gifted female artist, who had her own studio and was determined, no matter what obstacles stood in her way, to be a painter. Grandmother learned of my father's attachment to this women and his intention to marry her. His mother expressed shock and disapproval and ordered him to end the relationship at once, which he did. Late in his life, he told me that it had broken his heart, but, as a dutiful son, he simply could not act against his mother's wishes.

The other instance in which he and his mother clashed was over his choice of a college for his undergraduate studies. He desperately wanted to go to Amherst College, but she wanted him to go to Ohio Wesleyan University. This time they reached an impasse. Finally, she said that if he would go to Ohio Wesleyan University for two years and then if he still wished to go to Amherst, she would allow him to transfer. By the end of two years at her alma mater, my father was an active fraternity member, had no wish to leave and became president of an inter-fraternity group in his senior year. Father also graduated with honors, was elected to Phi Beta Kappa and became president of the Science Club. However, other evidence suggests that he believed that his educational experiences prior to graduate school were less than satisfying. In *Lands Beyond the Forest* (Sears 1969 p 3, 6, 7), in explaining the "many years" needed to understand the western prairies "whose description had so fascinated" him since childhood, he remarked that "... high school (with only a glimpse of botany) and college (with even less) were followed by two years of study in that science in Nebraska, a prairie state" where he at last found himself "under the guidance of a great teacher [Charles E. Bessey]," who transformed the lives of those he taught. Father earned his master's degree in botany under Bessy's direction.

In addition to his mother's strong influence on his early life, my paternal grandfather ("Father Sears") exercised the strictest discipline over his two oldest sons. When my grandfather died, my father read a tribute to him in the parlor at Rosedale, praising his father for his strength, manliness, "sagacity, and cool courage," as well as his "scrupulous regard for property rights" and lifelong devotion to "Mother Sears". In the concluding paragraph, my father made this observation:

> Upon his sons in their early childhood he lavished tenderness and affection. Yet he never forgot that they were born to become men and live in a world that is sternly real. As the years passed and they donned the *toga virilis* [toga of the grown man], the tenderness and affection drew behind a veil. But we knew that they were there and that knowledge was like a rock that cannot be moved" (Sears 1941).

Donning the "*toga virilis*" meant, for "Father Sears", that the oldest son would serve (*sans* pay) as "Father Sears'" legal assistant, in effect, a law clerk and amanuensis. Grandfather taught him to type professionally with both accuracy and speed, as well as to balance books. Father typed all of my grandfather's correspondence and legal work and kept his accounts. Among "Father Sears'" properties was "Mount Zion" about three miles southwest of Bucyrus; it comprised 200+ acres that included 80 acres of virgin forest. Father sold the farm to the State of Ohio; it is known as the Sears Woods State Nature Preserve. The farm had a large barn, silo, horses and carriages, chickens, including a rooster, sheep, and a herd of cows. One of my earliest remembrances was my father telling me about riding, as a child, with the family in one of these carriages and watching the sparrows follow their route to eat the corn in the horse droppings. Also as a boy, my father spent long hours doing chores on his paternal grandfather's farm. Among his responsibilities were milking the cows and feeding, exercising, currycombing and watering the horses. When he was about the age of 10, he had to cook three meals per day for his grandfather's 20 hired men during harvest at 10 cents an hour. Thus, in addition to his academic talents my father became a fair farmer, an expert typist, a skilled accountant, and a very good cook.

INFLUENCES OF THE ATOMIC AND SPACE AGES

Nothing in my father's training, however, seems a likely preparation for the two experiences that clearly highlight his entrance into today's world and to which he had quite opposite personal reactions. The first of these experiences occurred during the 1950s when he was a consultant on the Atomic Energy Commission's Plowshare Committee, the purpose of which was to develop peaceful uses for atomic energy. Father's role was to evaluate possible effects of various proposals for the use of atomic energy and its impact on the biosphere. Catherine remembers that, beyond saying "terrible, terrible!", he never mentioned the work of this committee or the nature of his involvement with it. Father told me about one specific Plowshare scenario that was so popular, he feared the committee might ratify it. The proposal was to detonate a "small" nuclear weapon to form a deep-water harbor in the Arctic, removing ice previously considered impenetrable. I had rarely seen him so upset and angry.

The second experience that highlighted his entrance into today's world occurred during the 1960s. Having served as a long-term member of the National Science Board, he was appointed, under its auspices, to three Presidential Science Advisory Commissions during the Kennedy, Johnson and Nixon administrations, respectively. In the 1960s, President Johnson invited him to Cape Canaveral to see the launching of a NASA missile. Afterward, he told me that witnessing that rocket launch was one of "the most thrilling experiences" of his life. Although he was reared in pre-industrial rural environs, he apparently had an aesthetic response of awe and wonder, without a breath of terror or even anxiety. Apparently the power, grace, color, motion and mastery of the spectacle moved him, much as he would have been moved by some comparable drama in the natural world.

Father shared, with Einstein, the conviction that the origins and value of any scientific endeavor were aesthetic in nature. To account for his lifelong fascination with prairies and other treeless areas after having been reared in northern Ohio, "where, even after a century of dogged cutting, trees were never out of sight," my father describes the wonder he felt as a child when his father told him of a trip the latter had made across the prairies in a covered wagon in 1878 when he was 18. "It was tantalizing to learn that there were great reaches of the earth where no trees grew."

During a trip as a child, my father was fascinated by "open water... the sweet-water inland sea [Lake Erie] fifty miles to the north was the first of the broad open faces of nature to take on reality to a then five-year old." As the train neared the shore, my father saw "beyond [an] unfamiliar array [of masts] stretched a vast gray-green sheet dappled and dancing in a light breeze. The impression of it, after seventy years, remains in the realm of sensation, not to be translated adequately into words."

After giving a few details of his later research on prairies, including problems that were to intrigue him for many years, he draws this conclusion. "The activities of scientists are channeled, though some might hesitate to confess it, by what are essentially aesthetic and intuitive drives" (Sears 1969 p 3-4, 11). I remember he often remarked that a well-cared-for, ecologically sound landscape, farm, pond or terraced mountain was also always beautiful and "harmonious" to the eye. As far as his ecological sensibility went, he did not separate aesthetic from other values:

> However sound the bill of particulars, [for the prudent management of our forest resources.] ... the facts of political life show that cold logic has tough sledding unless reinforced with a measure of emotional warmth. Granting that we must first cherish in order to protect and that grassland and desert have their appeal, tree and forest alike speak their message of beauty to the seeing eye. And to rich aesthetic appeal they add, for the thoughtful and compassionate, the ethical value of whatever is good for those who come after we are gone (Sears 1980 p 103).

In linking the beauty of the world with the values of the culture and the nature of the imagination or "the seeing eye," my father's message was not limited to scientists. In 1944, my father presented a lecture at the Royal Canadian Institute on the relation of ecology, especially the deterioration of United States agriculture, to the history of American landscape and genre painting, emphasizing "the imaginative spirit governing the paintings." John Alford (1944), Professor of Fine Arts at the University of Toronto, wrote to my father praising his lecture and affirming its main point that the "ecological implications" of the decline of New England culture reflect themselves in American art forms "just as the art, as a crystallization of cultural quality, demonstrates the effectiveness or otherwise of the ecological techniques."

Paradoxically, Father's "seeing eye", witnessing a space launch and the deep mark it made upon his imagination did not prevent him from ignoring the astonishing new discoveries in astronomy and physics leading to the formulation of the field of astrophysics and its cosmological implications. For a man whose intellect, at least, was open-minded and accustomed to looking at the world from a variety of perspectives to reconcile and synthesize contradictions into a larger, more comprehensive point of view, was ambivalent toward space science. If anything, he regarded it in an adversarial rather than complementary position with respect to ecology. Is the future of a civilization better served by spending funds for getting a man on the moon or by using those resources for managing human interactions with nature? The space exploration budget is about the same order of magnitude as the estimated cost of cleaning up our air and water. To assign a higher budgetary priority to the region beyond our atmosphere disappointed my father. (Sears 1966 p 179).

His first public response to space exploration was a qualified, almost sarcastic acceptance. In 1957, after the Soviets launched Sputnik to the applause of the world, he gave his closing address as President of the American Association for the Advancement of Science (AAAS). To his colleagues and the assembled press corps he said, "I have no quarrel with the exploration of outer space. But as we extend our astronomy by whatever celestial acrobatics we can get away with, I should like to see some consideration given to relative values. We have a vast amount of unfinished business at our feet." (Sears 1958). His begrudging acceptance of space exploration was clear, I think, from the tone and language of his remarks. Indeed, as its success increased, he turned his back upon the whole space endeavor as an enterprise so wantonly wasteful of the energy and resources he felt were so badly needed for the "unfinished business" here on earth. In his old age, my father had a chance to republish his article "The inexorable problem of space" (Sears 1972). In it, he single-mindedly insisted that any further resources spent voyaging beyond our planet precluded commensurate efforts here to conserve it.

His response to space exploration was uncharacteristic because my father was not usually so acerbic when voicing his views in public. He resembled Huxley, about whom he said

> ... as a controversialist, [Huxley] fought with a smile seldom distant [and with] little harshness from his lips or pen. . . His intelligence was too finely poised, his imagination too sensitive to permit him to become doctrinaire. And he had that superb quality without which morphology [or ecology] is blind or stupid: an intuitive sense of form. Of this his literary style is proof" (Sears 1950b p 42-43).

In his capacity as a public figure, my father disliked taking an adversarial role. Even in social situations, he did not like to appear to be in disagreement with the cultural or political consensus of whatever gathering he attended. Like many writers, he had a strong susceptibility to criticism. For years, a brief, unsigned, taunting review of his book on Darwin (Sears 1950) in *The New Yorker* roused his ire and distress with *The New Yorker*'s lack of integrity to allow reviews to remain anonymous. He had a gift for eliciting approval in almost any set of social or professional circumstances, even if that meant being, as Catherine rather dryly puts it, "something of a chameleon." That gift had a valuable, indeed critical, function in his role as a pioneering environmental ecologist. He was one of the first scientists to deliver the unpleasant message to the public that we must take care of our biosphere or perish, taking with us most of the remaining species of life on earth. He was able to articulate this message without alienating his audience and readers.

HOBBIES AND TALENTS

The thinking and attitudes that my father exhibited with respect to space science was not characteristic of him in his strategic dealings with the public and business worlds, where he unflaggingly worked for compromise and dialogue; or in his intellectual life, the very nature of which was eclectic, dialectical and interdisciplinary or in his daily activities and interests. Father's evening "pleasure readings" ranged from literary figures like Agatha Christie to Voltaire, Rabelais, Pascal, Mark Twain and Shakespeare to anthropologists such as Margaret Mead (the only person he admitted could talk more than he), Ruth Benedict and Loren Eiseley. Among the disciplines in which he was a master were botany, geology, forestry, palynology (pollen analysis) and climatic studies. He knew Latin in a living way and was thoroughly versed in history both ancient and modern, including that of science, agriculture and the origins of civilization. Late in his 60s, he retaught himself algebra so that he could then learn calculus. When he was not reading, he did calculus problems at night for fun. Never, in my experience, was he mistaken about the meaning, pronunciation, spelling or root of any word. He dispatched the crosswords in the Sunday *New York Times*, usually without error and in ink.

In his 60s, he taught himself to fabricate cane chairs, requiring extraordinary patience and manual dexterity. He gathered and cured the plant materials, learning which rushes to pick at what state of greenness and how to dry them slowly to preserve their flexibility by keeping them damp. He conducted caning in the basement, alone, after dinner. In his 80s, he taught himself to paint in watercolors, keeping the colors from getting muddy, and the stroke of the brush correct the first time and the effects of light achieved correctly. Among the items he left that I cherish most is a sparkling small watercolor of white dogwood in a 19th century ruby glass vase.

He was a talented artist, taking sketch pads with him on his travels and field trips and, either with drawing pencils or preferably with pen and India ink, sketched anything that caught his eye including plants of all kinds and especially cacti, fences, clumps of trees by water in an otherwise arid landscape, old churches, Mexicans taking siestas with their heads covered by sombreros and Native American women sitting in rough sun shelters selling pottery along the highway. Father's best sketches were of high quality: sure in line and perspective and usually interesting to view. He often used them to illustrate his books. In the last months of his life, he told me that if he could do it all over again, he would have been an artist. Of all the activities he pursued, drawing and painting, block printing and woodcarving gave him the greatest pleasure.

Through endless practice, including study and imitation of Chinese quill and brush strokes, he mastered several forms of calligraphy, including Gothic. He made quill pens for calligraphy on cards, pages or scrolls using fine paper to inscribe an original poem, quotation or a thought to celebrate a birthday, mourn a death or honor a friend's achievement. With this skill and repeated practice, he worked out a monogram with the letters PBS forming a simple yet elegant design in one unbroken line. This design became his signature later in life.

His wide range of interests, skills and talents required flexibility and discipline and are activities one does alone. Though the setting was often his home, the pursuits themselves were solitary by their very nature, though he seemed to like the presence of others nearby while engaged in them. For example, he would play solitaire at the

kitchen table in the midst of family traffic, often commenting on his plays. He would emerge from his workroom to show his latest sketch to whichever one of us he could grab. Even when he was writing his books and articles, he kept his study door open. In our residence in Oberlin, his study opened directly onto the living room and was adjacent to the front hall and door. As a child, my friends and I traipsed in and out of the house and its rooms, making noise to the sound of his typewriter clattering away without a break. Clearly, he wanted proximity to others but in his concentration, absolutely shut others out as if he were alone and undistracted.

PUBLIC SPEAKER

Father was at his best on stage. The act of performing brought his inner self to life. It was as if he felt most safe in an arena that typically terrifies people. Father always welcomed an audience and, at least in public life, he also knew how to make an audience welcome him. He relaxed his audience immediately. After a warm gesture as he moved to the podium, he often began by telling a joke, which worried my mother, who feared that it might be "an old chestnut." His jokes, including the old chestnuts, almost always roused a solid appreciative laugh. He was a good story teller, with an unfailing ear for dialogue and dialect and an impeccable sense of timing, making the audience comfortable, trusting and eager to listen.

Father projected an image of an unpretentious caring man of wisdom, dignity and warmth. At his best, he was capable of transporting, even enthralling, his audiences. However, he never lost his audience because of his knowledge and understanding of a subject and an implicit promise that he possessed an unique perspective and grasp of the relation of our species with the natural world. He spoke with the utmost clarity, in language free of jargon, banality and technical or esoteric terminology while using examples from everyday experience, in a language that had a natural rhythmical beauty and precision. As a speaker, my father projected a new way of seeing the world that illuminated a deep structure of nature and its mysteries and contradictions.

When I think of my father at his best as a speaker, I am reminded of Odysseus in the *Iliad*, whose outward appearance was not particularly prepossessing, "but when he let the great voice go from his chest, and the words / came drifting down like the winter snows, then no other mortal / man could stand up against Odysseus" (Lattimore 1961 p 106). So compelling was the persona my father projected in the public arena, I often forgot that he was my father. "What extraordinary humanity this man has," I would think, feeling that everyone should listen to his words, heed his warning about the fragile balance of life on our planet and how we must cherish and protect it.

I am speaking mainly of the 1940s and 1950s, the period of time when I heard my father in public fora. I considered him prophetic then and now. Of course, he offered environmental warnings since the 1930s, as well as explanations of and suggestions for preventing ecological damage, most notably with the publication of *Deserts on the March* in 1935

Father was not alone in foreseeing an impending ecological disaster for which our species is responsible. But he was one of the first, as noted when he received the Distinguished Service Award from the American Institute of Biological Sciences in 1976. The citation praised his "understanding of natural resource phenomena," which often predated that of his peers by 30 years or more. In the last decades of his life, my father believed that irreversible processes had been set in motion, but he would not say so publicly. When I asked him in his mid-90s what he thought was going to happen to our earth, he answered simply, "disaster." I challenged him, "then why don't you say so"? "You can't discourage people too much," he answered.

From years of public performing, plus his finely honed instinct, my father knew what audiences can understand and the danger of asking people to confront themselves and/or the probable consequences of their actions for fear of losing their interest in the profound ecological impact of humans and its implications for the survival of the biosphere. His perspective about the interdependence of earth's life forms with each other and with the environment was new and even radical at that time. He offered, in the words of Duffus (1937), a new "synthesis" whose importance is that "it foreshadows a new way of dealing with matters of urgent and common moment." Father thus followed his own injunction (Sears 1962 p. 174) that "it should never be forgotten that the primary role of science in the human adventure should be to give us the gift of perspective, so that we may be guided in its use." Presenting his vision by public lectures and participation in scientific organizations were prime motivational forces in my father's professional life. The two activities provided ongoing, somewhat overlapping and continuous fora for my father's ideas.

These activities also often required my father to be "away." Travel schedules, read aloud by my father in solemn, ritualistic tones with my mother packing and unpacking suitcases, washing and ironing for the next trip were integral activities in our household. All three of us grew up believing that being a "father" meant, by definition, being away from home most of the time. In addition to our collective childhood memories, data from external sources (e.g., Wittke correspondence cited below) bear witness to the fact that my father appeared in public arenas away from home and work as frequently as he could manage without drawing more than mild criticism. Of course, as Catherine pointed out to me, his successful books, articles and reviews plus all his appearances, appointments, lectures and awards gave Oberlin tremendous national publicity and more freedom at the college. As adults, Paul, Catherine and I agreed that no matter how justified his lecturing was from a professional point of view, he seemed driven by some inexplicable force that expressed itself in a lifelong pattern of compulsive traveling, of leaving home and work and returning to them, only to leave again. He had a joking motto that acknowledged that his mission as a messenger about the global impact of the destructive potential of human-induced ecological change was more important than professional advancement, "Have fiddle, will travel."

Before he accepted Oberlin's offer of a faculty position, he received permission in writing from Carl Wittke (1938), Dean of Arts and Sciences, to make "occasional brief trips to meet lecture appointments. As you say, as long as this does not become a major industry there can be no objection to it." Father also asked "to have a minimum of committee work" while serving as Chairman of Botany, adding that he would be glad "to do whatever is absolutely necessary from the first" until his work was well organized and some of his "most urgent writing . . . accomplished" (Sears 1938). He wrote, but the trips to give lectures were to become anything but "occasional."

Although Wittke and my father became and remained firm friends, by 1941, a certain acerbic tone began to creep into his responses to my father's off-campus commitments. For example, on 25 August 1941, Mrs. Silas B. Waters, President of the Ohio Association of Garden Clubs of Cincinnati, wrote to Wittke, that my father was the speaker they needed for their annual Garden

Club Conference on 24 September to educate the public on soil erosion. Replying that he appreciated her praise of my father's "outstanding work," Wittke (1941) added, "... I think it is very important that Mr. Sears be in Oberlin during the first week of school and meet his classes in the regular way. We have been very glad to give Dr. Sears an opportunity to address various groups in many parts of the country, but there are certain times in the college year when I think he should be on the grounds" (Sears 2005). By 1944, having sent Wittke two letters about some kind of recognition from Mississippi, plus an invitation to come and receive same and no doubt give a lecture, my father received the following reply (Wittke 1944).

> You know how much I personally appreciate recognitions of this sort as they continue to come to you. You also know how sincerely I sense the social consequences of the work you are doing and appreciate the particular crusade in which you are interested. Nevertheless, to be perfectly frank, I continue to hear some criticism about your being away so often, and I think it is still important that we keep this criticism down to a minimum.

Wittke added his hope that if my father went to Mississippi, "You will make it at a time when you will not have to miss any of your classroom work." Wittke also noted that he wished to keep criticism to a minimum "for the sake of the department and its future relations to other parts of the College."

Nevertheless, Wittke's complaints fell silent as my father's stature continued to grow. His vita for 1948-1949 gives a dramatic yet characteristic example of his professional activities. In 1949, he finished his book on Darwin, published an article in the *American Scientist,* wrote three reviews in journals, had "others in press", received a $2,500 Grant-in-Aid from the Geological Society of America for his pollen analysis research and a $500 grant from The Rockefeller Foundation for various conservation projects. In March 1948, my father was appointed and received Oberlin's permission via Wittke to serve as a director of the United States Chamber of Commerce, representing the Ohio Department of Natural Resources. He also was elected President of the Ecological Society of America in 1948. In 1949, he became President of the Ohio Academy of Science and was a Member of the Executive Committees of both AAAS and the Ecological Society of America.

As he became more well known, my father's priorities and the "away" pattern of his activities became increasingly entrenched. In his annual report to W. Blair Stewart, Oberlin's new Dean of Arts and Sciences, about his work in 1949, for example, my father listed first *Some 30 lectures during the past year* [emphasis his]. In addition to the lectures, he was away for 12 days (not including travel time) in Mexico, Distro Federal, doing fieldwork; to two nonconsecutive days testifying before the Joint Committee of the New York Legislature, for attending regular meetings of the Ohio Wildlife Council and for serving as consultant to the Conservation Foundation of New York. Here is a brief but representative fragment of his 1949 lecture itinerary: on 11/11, Soil Conservation Society in St. Louis; 11/14, Brooklyn College Honors Day, Brooklyn, N.Y.; 11/18 and 11/19, American Association of Biology Teachers, Cranbrook Institute, Cranbrook, Michigan (Sears 1950a).

Father's penchant for travel did not change when he left Oberlin in 1950 to assume the post of the Director of the newly established Conservation Program at Yale University. In an unpublished senior essay, David Simon (1985), a Yale student, studied the history of the program and of my father's tenure as Conservation Director. Simon's central observations concern my father's absence from Yale at critical points. Sears' stature within the American scientific lecturing and consulting community as well as the conservation movement "drew him away" from Yale. Simon notes that my father traveled widely and was an active member of many committees, but concludes that it was finally his role as President of AAAS "more than any other" that would keep him crisscrossing the country. In addition, while Sears' position did much to promote the Conservation Program nationwide, his absence from New Haven deprived the Program of valuable guidance and oversight. Ninety percent of responding graduates of the Program and all of my father's colleagues interviewed by Simon (1985) noted "his fluctuating commitment as one cause of the Program's decline."

Simon (1985) concludes, "Unfortunately, [I] was unable to develop precise figures about Sears' division of time between New Haven and elsewhere. It seems, however, at least during his tenure as President of the AAAS, that Sears spent almost as much time on the road as he did in New Haven." I can verify that at least some of these students missed my father terribly when he was not in New Haven, for they told me that at the time. As far as the failure of the Conservation Program goes, however, Simon by no means lays the entire blame at my father's feet. Father agreed by sending me a copy of the essay and remarked that he found Simon's analysis, accurate overall.

THE FINAL YEARS

Invitations for my father to speak continued well past retirement. No matter what combination of forces drove him to do so, by continuing to articulate his underlying view he was also continuing to "do good" in the world. Similarly, no matter what corners he cut with his teaching and administrative duties, his actual accomplishments certainly should have been sources of pride. However, at the end, they scarcely seemed to matter, as certain fears, regrets and uncertainties about the past began to surface. Though he was able to share these with me, sharing did not diminish them: they became the leitmotiv of his twilight years, increasing in intensity as he neared death.

The acceptance of the interdependence of life and death as a process seemed to dissolve for him, to cease to matter, certainly to comfort, as the end of his life approached. Summarizing this aspect of my father's vision, Duffus (1937) wrote,

> There seems to be, and is, a constant struggle. No equilibrium is lasting. But the image is also one of life constantly flowing into new forms. The forms may wage a war or arrange an armistice, but life does not make war against itself.
>
> Human beings, however, have a natural desire to remain human beings and not be transformed into other forms of life, no matter how interesting and beautiful that process may be. Individually we must prepare for death if for no other reason than that [and here Duffus quotes my father] 'the means of subsistence upon earth are limited, and the speedy price of universal survival would be universal death.'

Against the prospect of his own death, however, my father fought like an embattled titan. The force of his will and his animal vitality were amazing. Catherine, who performed hospice work, told me that she never encountered any person who so stubbornly resisted accepting the fact that they were at the end of their journey. His vigor was amazing in view of his physical habits. Other than field trips and daily strolls, he never exercised in his mid- and later

years. However, he continued to eat generous portions of the cholesterol-rich diet he had eaten all his life. When he finally had to relinquish this diet as he neared death, he did so reluctantly. In his late 80s, he reluctantly quit pipe smoking because he decided it was not good for him.

Gone were the philosophical underpinnings of a lifetime that may have helped my father accept his mortality. Other concerns took precedence including unresolved questions about his youth, about the choices he had made or failed to make, a sense that something had gone terribly wrong without his knowing it. He spoke as if he had been thrown off track somewhere along the line and never recovered. But other than a few pained remarks about his education and more about his marriage, he could not say where, how, and least of all, why. Nor could he drop his obsession with what he did not understand. One was that if only his mother had allowed him to attend Amherst, he might have received "a real education," rather than having been led astray, indeed "corrupted," by "fraternity values" after he joined Delta Tau Delta. He made this lament repeatedly. But when I asked him to elaborate, i.e., to tell me what "values" he was speaking of, he could not do so.

Given the nature of his achievements, these feelings may seem surprising. It is difficult to imagine what else *he* imagined he might have accomplished professionally except, perhaps, obtain a higher status as a research scientist. It did pain him, when he was in his 60s, that he had never been elected to the National Academy of Sciences. Nevertheless, I think he accepted his potential as a research scientist. Intellectually, he knew that the vision that informed his life's work was of lasting importance.

His academic life had its roots in the world of his past, in a manner similar to Einstein whose "sensibilities were formed during the 19th Century" and who therefore "in the deepest sense a 'classical' physicist" (Bernstein 1991), rejected quantum mechanics because it threatened his classical (i.e., "causal") view of reality. Characterizing that view, the German physicist Werner Heisenberg (1901-1976), who advanced the uncertainty principle in 1927, wrote,

> To the 19th century 'nature' appeared as a lawful process in space and time, in whose descriptions it was possible to ignore, as far as axioms were concerned… both man and his interference in nature. Today, however, [because] every process of observation of elementary particles causes a major disturbance, we can no longer talk of the behavior of the particle apart from the process of observation… The familiar classification of the world into subject and object, inner and outer world, body and soul, somehow no longer applies, indeed leads to difficulties (Heisenberg 1972 p 122-35).

Father's reliance upon that traditional and familiar classification of the world based upon the principle of causality was axiomatic. Throughout *Deserts on the March* (Sears 1935), one finds references to the "laws of nature" in the classical 19th century sense. Ironically, he was to conclude his life with an about-face in his worldview that his classical training had informed him for an incredible span of years. In several phone calls a few months before his death, he repeated, "It's all a mystery! Everything is a mystery!" When I asked him what he meant, he replied, "Nothing is predictable! It is as if the laws of nature no longer applied. What should be cause seems to be effect and vice versa. Nothing works as it should." However, he refused to give me any concrete illustrations, except to remark, as if by way of explanation, "I never dreamt I would live this long!" He said these words as he clung to life with intensity. Therefore, I assumed that his conversion had its origins in his physical vulnerability and slow but unremitting physical decline as cancer spread throughout his system. Astonishingly, because only his heart and brain were unafflicted, he had little pain until the last week or so of his life, when the cancer spread through his bones. Then every time he was moved, he was in excruciating pain. "I can't help screaming," he said to me in a matter-of-fact tone.

Physically, indeed, he was almost totally dependence upon others and when he could no longer walk, as his spine was so bent, he still pushed his wheelchair for a little trip around the gardens outside. Had his mind been as feeble as his body, he would have been spared the ontological distress that his reluctant revelation "Everything is a mystery! Nothing is predictable!" brought upon him in his last weeks and days of life. Unconsciously, and with these words, he made his final revisions of *Deserts on the March* (1935), especially of the assumptions informing such passages as these:

> The laws which govern the development of soil and vegetation are as inescapable as the laws of energy and conservation of matter upon which they are based. No matter how complex and *seemingly* [italics mine] mysterious the operations of the organic world they are still based upon cause and effect . . . Balance and equilibrium are demanded by nature… The meaning of all these discoveries in a few words is this: the inexorable laws of cause and effect operate in the production of food from the soil just as in every other realm of physical experience.

Paradoxically, the last revisions in the great text of his life brought his scientific consciousness up to date, or almost so, and modernized his world view. I say "almost" because had he allowed himself in his earlier years to encounter the premises and implications of quantum theory with an open mind, they might well have consoled and interested him rather than threatened and confounded him. Heisenberg (1972), in fact, uses an ecological simile to illustrate his new worldview:

> Natural forces [are] now exploited that were almost unknown to people in direct experience with nature.… technology transforms our environment before our eyes, and impresses our image upon it. [Just as in the ordinary world of nature where today] for the first time in history man on earth faces only himself… [finding] no longer any other partner or foe … striding through landscapes so transformed by man, we invariably encounter structures created by man, so that in a sense we always meet only ourselves …[so] in science also, the object of research is no longer nature in itself but rather nature exposed to man's questioning, to this extent man here also meets himself.

How close is Heisenberg's simile in spirit and view to these words from *Deserts on the March* (1935 p 198, 200):

> Man … has become the sponsor of a biological experiment without known parallel in the history of the earth and its inhabitants. He is the first example of a single species to become predominant over the rest.… never has a single kind so completely swept all others aside and taken possession as has mankind.… he no longer accepts, as living creatures before him have done, the pattern in which he finds himself, but has destroyed that pattern and from the wreck is attempting to create a new one. That, of course, is a cataclysmic revolution.… It is not merely soil, nor plant, nor animal, nor weather that we need to know better, but chiefly mankind himself.

Certainly, Dad and Heisenberg, among many others such as Fairfield Osborn, G. Evelyn Hutchinson, and the senior scientists who signed the 1992 Warning "to all humanity" (World Scientists 1992-93) agree that, at least on our planet, it is not the natural world, whatever principles may or may not govern it, that is our foe or that we need fear. To the contrary, we are nature's foes and hence our own; it is ourselves that we should fear.

For all the order he perceived in nature, my father perceived disorder, selfishness, expediency and destructiveness in humanity. For example, he wrote in *Deserts on the March* (1935 p 114) that "Mankind seems to have a stubborn genius for learning the most important lessons the hard way .... We may count on human stubbornness to return again and again to the attack [on the environment] unless there is some restraint."

But my father also saw the positive, even creative, side of humankind that "The activities of scientists are channeled, though some might hesitate to confess it, by what are essentially aesthetic and intuitive drives" (Sears 1969 p 11). Then he admitted, "...these reflections are not all proved and therefore not scientific in the current fashion" (Sears 1969 p 39).

Despite fleeting moments of irritation, I have forgiven whatever hurt I once perceived, for I know it was not intentional. I loved him deeply and still do. Because I learned to see the natural world through his eyes, I love the earth and I greatly respect the endeavor that was his life's work. He says this better than I, so I end this memoir with his words (Sears 1950 p 48):

> Unfortunately for those who would trace the influence of any creative mind or character, the world of human thought and action is no quiet pond. It is instead a deep and surging sea with countless forces at work below its surface and upon its unresting face. On such turbulent waters even the boiling wake of a huge vessel soon merges into the general activity.

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